

Remarks/Arguments:

Introduction

Claims 1-12 are pending. Claim 1 has been amended to describe the powder. Claims 7-12 have been canceled. Claims 13-23 have been newly added. The basis for these amendments are found in ¶¶ [0015], [0017], [0031], [0036], [0037] and [0038]. No new matter is introduced with these amendments. Entry of the claim amendments is respectfully requested.

Section 112 Rejections

Claims 7-12 are rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. Claims 7-12 are rejected under 35 U.S.C. §101 as allegedly not reciting any process steps. Claims 7-12 have been cancelled. Withdrawal of the Section 112 & 101 rejections of claims 7-12 are respectfully requested.

Section 103 Rejections

Claims 1-3, 6-8 and 10-11 are rejected under 35 U.S.C. §103(a) as allegedly being obvious over European Patent No.0895809 to Satoru (hereinafter "Satoru") further in view of US 4,280,929 to Shaw et al. (hereinafter "Shaw"). Applicants respectfully traverse.

On page 3 of the Office Action the Examiner provides an analysis of the teachings of Satoru. In the analysis the Examiner fails to indicate that Satoru also teaches that although carrier-supported catalysts may be used in the preparation of (meth)acrylic acid and (meth)acrylonitrile, it is likely that the use of a carrier adversely affects the reaction, thereby leading to a lowering of the yield of desired products (cf. Satoru, ¶ [0009]). This statement appears to be confirmed by the examples in Satoru. A comparison between the results of Example 1 and Example 7 shows that the unsupported catalyst produced acrylonitrile in a yield of 53.1% (Example 7) whereas a virtually identical supported catalyst produced a significantly lower yield of 47.9% (Example 1) (cf. Satoru, Table 1, p. 22). From these arguments it is

evident that Satoru teaches against the use of a carrier in the preparation of a catalyst for the oxidation or ammoxidation of alkanes or alkenes.

Additionally, while Shaw teaches catalysts and silica, Shawa does not take the method of the presently claimed invention. Specifically, Shaw teaches that the silica must be added in two steps, wherein in the first step fumed, powdered silica is used and a second source, other than fumed silica, must be added in a second step (Shaw, col. 1, ll.49-59). The catalysts thus obtained have better physical strength. This is confirmed by the Experiments in Shaw. Shaw's example 1 employs a catalyst that was prepared according to Shaw's teaching with addition of fumed silica followed by addition of silica sol, whereas the catalyst of Comparative example A was prepared with twice silica sol (cf. Shaw, col. 3, ll. 42-col. 4, ll.17). These catalysts were used in the oxidation of propylene. Although the teachings of Shaw result in catalysts with a greater strength, Shaw also provides results of the oxidations that show that the comparative example A scores higher in the yield of acrylic acid (cf. Shaw, Table 1, col. 4, ll. 22-27).

Hence, Shaw teaches that the use of fumed silica in the preparation of catalysts for the oxidation of olefins to unsaturated acids yields catalysts with a worse performance than the use of silica sol in such preparation. It is submitted that Shaw also teaches away from the present invention.

The Examiner considers the claims obvious over the combine teachings of Satoru and Shaw. However, in accordance with established US practice, an incentive is required for the person of ordinary skill to make such combination (cf. KSR v. Teleflex). It is respectfully submitted that when Satoru teaches away from using any carrier and when Shaw teaches away from the use of fumed silica the skilled person does not have any incentive to combine the teachings of these citations. Therefore, Satoru, Shaw or the combination do not teach or suggest the presently claimed invention.

The non-obviousness of the present invention is not only supported by the teachings of Satoru and Shaw, but also by the advantageous effects of the catalysts prepared according to the present invention against expectations.

To show the advantageous effect of the present invention we enclose a declaration by one of the inventors wherein some additional experiments have been described. In these experiments, a side-by-side comparison has been made between two catalysts. In denoted Comparative Experiment 1A a catalyst has been prepared according to the invention using an inert carrier consisting of silica in the form of a dry powder (Aerosil 300). The second catalyst used in denoted Comparative Experiment 1B has been prepared using a silica sol (Ludox). The composition of catalytically active metals on the catalysts was the same. Both catalysts were prepared in the same way as described for Example 1 of the present application, which means that the drying step was done via spray drying. The performance of both catalysts was compared in the oxidation of propane to acrylic acid which was conducted in substantially the same way as described in Example 5 of the present application. The results are shown in the Table below. (The abbreviations in the Table have the same meanings as in the present application).

Table. Results of $\text{Mo}_1\text{V}_{0.3}\text{Te}_{0.23}\text{Nb}_{0.12}$ catalyst composition in propane oxidation (410 °C)

Experiment	C ₃ conversion (%)	Selectivity AA (%)	Yield AA (%)	PV (ml/g)	SA (m ² /g)	APD (g/ml)
Comp. Exp. 1A	49	83	41	0.28	38	1.8
Comp. Exp. 1B	63	19	12	0.12	23	2.5

It is immediately apparent from the values for the pore volume (PV), the surface area (SA) and the apparent particle density (APD) that catalyst in Experiment 1A according to the invention is different from the comparative catalyst of Experiment 1B. These differences result in a much higher selectivity and yield of acrylic acid. This advantage is very surprising and cannot be deduced from the teachings of Satoru, Shaw or the combination of the references.

In his discussions of previously submitted arguments the Examiner observes that the claim language does not represent a requirement for the carrier to be in the form of a dry powder. To make that even clearer we have included this requirement explicitly in the wording of presently amended claim 1. We trust that the amendment, the evidence from the declaration and the arguments above render claim 1 in condition for allowance.

Thus, Satoru and Shaw, individually or in combination, fail to teach or suggest the invention as presently defined in claims 1-3, 6-8 and 10-11. Therefore, reconsideration and withdrawal of the rejections of claims under 35 U.S.C. §103(a) are respectfully requested.

Claim 4 is rejected under 35 U.S.C. §103(a) as allegedly being obvious over Satoru, Shaw and further as evidenced by Wypych (Handbook of Fillers, 2nd edition, 2000) (hereinafter "Wypych"). Applicants respectfully traverse.

The above-argument equally applies herein as claim 4 depends from claim 1. The fact that the particle size of fumed silica was known does not take away the inventivity from the newly presented claims since Wypych does not relate in any manner to the suitability or

unsuitability of certain catalysts or carriers in the oxidation or ammoxidation of alkanes or alkenes. Reconsideration of the rejection is requested.

Accordingly, Satoru, Shaw and Wypych fail to teach or suggest the invention as presently defined in claim 4. Therefore, reconsideration and withdrawal of the rejection of claim 4 under 35 U.S.C. §103(a) is respectfully requested.

Claims 9 and 12 are rejected under 35 U.S.C. §103(a) as allegedly being obvious over Satoru, Shaw and further as evidenced by U.S. Patent No. 5,380,933 to Ushikubo (hereinafter "Ushikubo"). Applicants respectfully traverse. Claims 9 and 12 have been rejected therefore the rejection is moot.

The Examiner cites Ushikubo as allegedly teaching the preparation of acetic acid. However, Ushikubo discloses the preparation of unsaturated carboxylic acids. Therefore, it cannot relate to the preparation of acetic acid. Further, the paragraph at col. 5, ll.27-32 indicates that the alkane that is to be used to produce the desired unsaturated carboxylic acid does not need to be very pure and may contain ethane (as a contaminant). This paragraph does not teach that ethane is to be used to obtain acetic acid. Since Ushikubo does not appear to have any relation with the subject matter of the claims under investigation, reconsideration of the rejection is requested.

Accordingly, Satoru, Shaw and Ushikubo fail to teach or suggest the invention as was defined in claims 9 and 12. Withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

Claim 5 are rejected under 35 U.S.C. §103(a) as allegedly being obvious over Satoru, Shaw and further as evidenced by European Patent No. 1,358,932 to Han et al.(hereinafter "Han"). Applicants respectfully traverse.

The above-argument equally applies herein as claim 5 depends from claim 1. Claim 5 relates to a processing step of the catalyst to obtain catalyst with a certain particle size. The fact that the particle size of oxidation catalyst was known does not take away the inventivity from the newly presented claims. This is the more so as Han teaches that the use of a support exhibits deleterious effects in the process for the preparation of acrylic acid (cf. Han, p. 13, ll. 15-17). The use of alumina is seen as the least disadvantageous support. One cannot but conclude that the teaching of Han is similar to that of Satoru or Shaw, both teach away from the use of a supported catalyst.

Accordingly, Satoru, Shaw and Han fail to teach or suggest the invention as presently defined in claim 5. Therefore, reconsideration and withdrawal of the rejection of claim 5 under 35 U.S.C. §103(a) is respectfully requested.

The prior art made of record and not relied upon includes Grasselli (US 4,377,500) and Hensel (US 3,773,692). We submit that Grasselli is irrelevant to the present invention since Grasselli relates to an antimony-containing redox catalyst on a carrier that comprises a combination of silica sol and fumed silica. The catalyst does not contain niobium. Therefore, the catalyst according to Grasselli does not impact on the currently claimed invention.

Hensel also describes catalysts that contain antimony (and, in addition, tungsten). When the document describes the heat treatment of, optionally supported, catalysts, such heating is conducted in two stages at different temperatures. The second stage must be done in the presence of an oxygen-containing gas (cf. Hensel, col. 2, ll. 36-52). Since our claims stipulate that the catalyst comprises Mo, V, Te and Nb, and that the supported catalyst is calcined in an inert atmosphere, Hensel is considered irrelevant, too.

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Summary

Therefore, Applicants respectfully submit that claims 1-6, and claims 13-23 are patentably distinct. This application is believed to be in condition for allowance. Favorable action thereon is therefore respectfully solicited.

Should the Examiner have any questions or comments concerning the above, the Examiner is respectfully invited to contact the undersigned attorney at the telephone number given below.

The Commissioner is hereby authorized to charge payment of any additional fees associated with this communication, or credit any overpayment, to Deposit Account No. 08-2461. Such authorization includes authorization to charge fees for extensions of time, if any, under 37 C.F.R. § 1.17 and also should be treated as a constructive petition for an extension of time in this reply or any future reply pursuant to 37 C.F.R. § 1.136.

Respectfully submitted,



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